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# The PREVENTION of ROUNDWORMS *in* PIGS

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## CONTENTS

	Page		Page
Damage done by worms-----	1	Permanent hog lots and feed yards	7
Sources of infection-----	2	dangerous-----	7
Development of a system of prevent-	3	Benefits from the system-----	7
ing infection-----	3	Summary of the swine-sanitation	7
The swine-sanitation system-----	4	system-----	7

## Damage Done by Worms

The common intestinal roundworm or ascarid<sup>2</sup> is one of the most injurious of the various kinds of parasites that infest the pig. It causes digestive troubles, retards growth and development, and in other ways interferes with the well-being of pigs, especially the younger animals. Furthermore, scientific investigations have shown that this parasite can cause a great deal of damage otherwise than merely as an intestinal parasite. In its early stages of development in the pig, and while still too small to be seen by the naked eye, the worm travels in the blood stream from the intestine to the lungs and then back to the intestine by way of the windpipe and esophagus. This curious journey (fig. 1) requires about 10 days for its completion, after which the young worm settles down in the intestine and grows to maturity in about 21½ months. If many of the young worms take this trip at the same time, as often happens, the injury that results is liable to be serious.

When the lungs of a young pig are thus invaded by numerous young worms, the pig often shows symptoms commonly known as thumps, and may die of pneumonia. Probably most of the cases of thumps in little pigs are caused by worm infection, though the characteristic thumping cough in young pigs has sometimes been attributed by some hogmen to an overfat condition, or cold weather with resulting lack of exercise. Pigs that survive a severe invasion of the lungs by the young worms frequently do not recover fully and fail to grow and develop at a normal rate. Bacterial compli-

<sup>1</sup> Died Sept. 17, 1925. This is a revision by M. C. Hall and H. B. Raffensperger of a mimeographed article by Doctor Ransom issued by the Bureau of Animal Industry July 1, 1921. The revision incorporates some minor additions which are regarded as desirable in the light of later developments.

<sup>2</sup> *Ascaris lumbricoides* or *Ascaris suum*.

cations, often with pus production, sometimes follow the invasion of the lungs by the young worms, and these infections share the responsibility for stunted growth of pigs.

Investigations and experiments have also shown that pigs are most susceptible to infection and suffer most seriously from the infection during the first few weeks of life. As they grow older they become more resistant, have fewer worms, and suffer less from both the young worms in the lungs and the older ones in the intestine. Little pigs, therefore, require special protection.

### Sources of Infection

Pigs become infected by swallowing the eggs of the parasite. These worm eggs are of microscopic size and are found in the manure

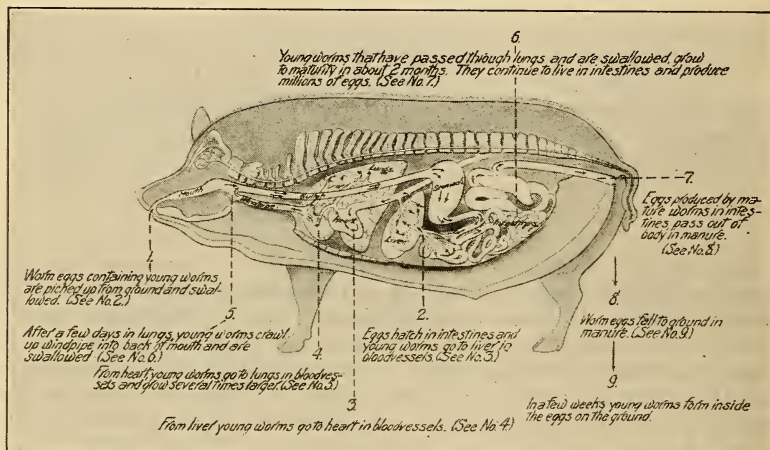


FIG. 1.—The course traveled by the roundworm in the pig. The worm eggs are swallowed by the pig and hatch in the intestines; the young worms go by way of the blood vessels to the liver and then to the lungs; here they leave the blood vessels and enter the air passages; go up the windpipe to the mouth and are swallowed; return to the intestines where they develop to adult worms; and the female worms produce eggs which pass out in the manure and start a new journey through the pig which swallows them.

of infested hogs or on and in the soil of places that have been occupied by infested hogs and hence contaminated by their droppings. It has been estimated that one full-grown female worm in the intestine of a hog may contain as many as 26,000,000 to 27,000,000 eggs. At the time they are passed out of the body of the hog in the droppings the eggs are not infectious. But in a few weeks or months, depending on the weather and various other conditions, the egg develops to a stage at which it contains a tiny worm, and it is then ready to infect the pig which swallows it. The eggs are very resistant to cold weather and drought; they are not killed by most chemical disinfectants, and are very long-lived (some may live as long as five years). Not all adult hogs harbor intestinal worms, even though exposed to infested soil; commonly, however, the parasites may be found in one out of three hogs of breeding age. Worms which can not be distinguished from the swine ascarid are also not uncommon in

human beings, especially children, in some localities. It is still a debatable point whether swine ascarids can develop to maturity in man, or vice versa, either regularly or occasionally, but both go through the lung-invading stage in man and swine.

From the foregoing it is evident that the soil of places occupied by hogs is likely to be heavily laden with the eggs of intestinal worms, and it is readily understood, in view of their food habits, how pigs kept in such places may become infested with large numbers of the worms. Worm-infested places (fig. 2) are especially dangerous for young pigs. It is largely on account of worm infestations that so many young pigs are lost or fail to grow properly when reared under ordinary methods of hog management. Unthriftness usually is caused by poor breeding, poor feeding, or parasites, and if the first two factors can be ruled out, the trouble is probably caused by parasites. (Fig. 3.)

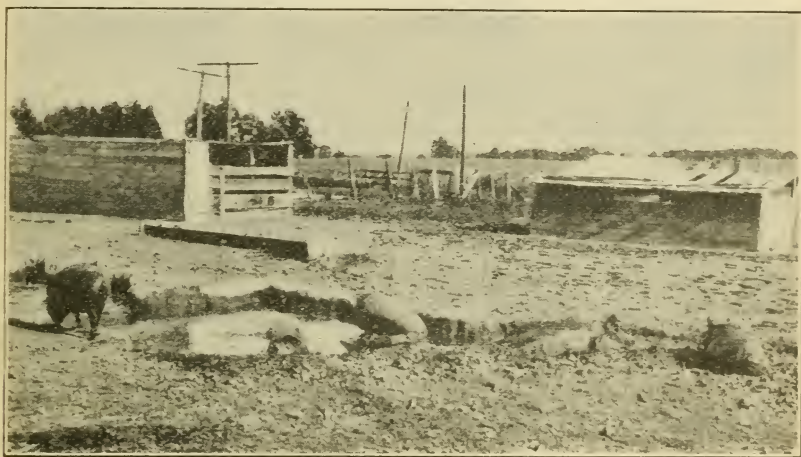


Fig. 2.—A dirty hog lot, a paradise for worms and a source from which susceptible little pigs may pick up worm eggs directly or by transfer from the skins and udders of the sows

### Development of a System for Preventing Infection

On the basis of the results obtained from laboratory study and experiments on a small scale a system of raising pigs to avoid worm infestation, or at least to reduce the infestation to a point at which it will cause little or no damage, has been worked out by the Bureau of Animal Industry. Through the cooperation of the farm bureau and public-spirited hog raisers of McLean County, Ill., this system was carefully tested on a considerable number of farms in that county for seven years. The results of these tests were so successful from the start that the use of this system has spread rapidly and continues to spread. It is now widely used, especially in the Middle West. Because it was first developed in McLean County it has been called the McLean County system of swine sanitation. The system not only prevents losses from worms, but also more or less completely prevents various diseases that may be termed filth diseases, such as bullnose, sore mouth, and certain forms of diarrhea.

It is not to be depended on as a preventive of hog cholera and, even though this system is followed, hog-cholera immunization should still be continued in accordance with approved methods of hog-cholera control.

### The Swine-Sanitation System

Essentially the swine-sanitation system consists in handling young pigs from the time of birth until they are several months old in a manner that avoids or reduces to a minimum the chances of infection with worms, or, in other words, that keeps young pigs entirely away from old hog lots or other places exposed to fecal contamination.

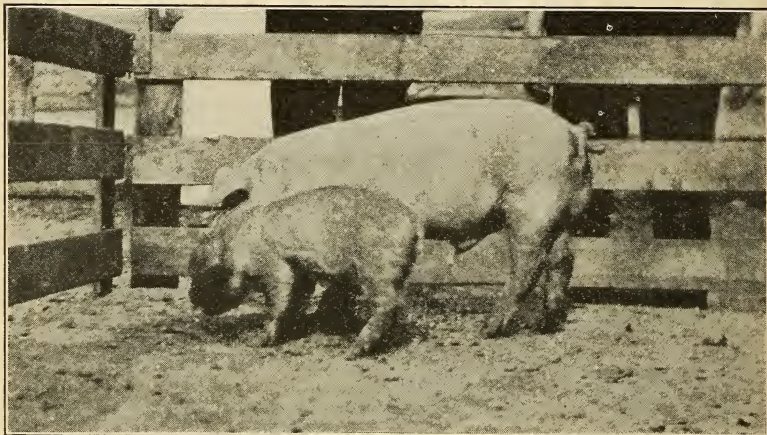


Fig. 3.—Two pigs of about the same age. The one in front is the typical runt, showing the effects of worm infestation and other troubles caused by dirty hog lots. The other pig is normal and healthy

### Spring Pigs

#### Farrowing Pens

Before farrowing time the farrowing pens, which should be of sanitary construction, are thoroughly cleaned. (Fig. 4.) All litter is removed, and the concrete and wooden floors and sides of the pens are thoroughly scrubbed with boiling water and lye. The heat of the water (if applied liberally and very hot) is destructive to worm eggs and the lye helps to remove the dirt. The indoor pens are shut off from the outside pens, which are commonly built in connection with permanent hog houses, unless these outside pens are of sanitary construction with concrete or wooden floors and are thoroughly cleaned before the sows and pigs have access to them. If the building is not artificially heated, the cleaning should be done in the fall before freezing weather, as it may be found almost impossible to clean the pens properly during the cold weather of early spring or late winter.

#### Sows

The sows are placed in the clean pens a few days before farrowing but not until the mud and dirt on their skins have been removed.

The udders particularly should be well washed with soap and water, and the feet should not be neglected. If this precaution of cleaning the skin of the sows is not taken they are likely to carry with them into the farrowing pens a multitude of worm eggs and other disease germs found in the soil of the hog yards, so that even with the first few mouthfuls of milk the newborn pigs may swallow hundreds or possibly millions of worm eggs and germs of disease. It has been found advantageous to oil the sow two or three days before farrowing as a control measure for mange and lice infestation. This is accomplished by hand applications of crude petroleum or crank-case oil. Further information on the control of swine parasites may be found in Farmers' Bulletin 1085, *Hog Lice and Hog Mange*.<sup>3</sup>

After farrowing, the sow and pigs are not allowed out of the farrowing pen until they are taken to pasture for which previous



FIG. 4.—Cleaning the farrowing pen. This is a matter calling for a shovel, broom or brush, plenty of hot water, soap and lye, and vigorous work

arrangements have been made. The sow and her litter, in from a few days to two weeks after farrowing, are moved to pasture by means of a barnyard "Pullman" consisting of a double crate on a sled which may be backed up to the door of the pen and hauled away. (Fig. 5.) The lower compartment of the crate is for the sow, the upper is for the pigs.

#### Pastures

A special pasture for the sows and young pigs is provided. This should not be a permanent pasture which has been much used by hogs and thereby more or less badly contaminated by their droppings, but a field that has been under cultivation and sown at the

<sup>3</sup> IMES, M. HOG LICE AND HOG MANGE. METHODS OF CONTROL AND ERADICATION. U. S. Dept. Agr. Farmers' Bul. 1085, 28 p., illus. 1920.

proper time to a suitable forage crop. Legume pastures available in the normal course of crop rotation may be utilized, devoting a different field each year to this purpose. Individual shelter houses for each sow and her litter should be provided in the pasture, thus tending to keep the various sows and their litters separate. Though one house for all the sows and pigs may be used, this is not so desirable, as it tends to concentrate any infection that may be present in any animal. Water is supplied by piping or by tanks replenished by hauling water to them. No other hogs should have access to this pasture, nor should the pigs be allowed to run back from the pasture to the barn lot or hog yards. They are thus kept away from the contaminated places until they are at least 4 months old, or until they weigh about 100 pounds, after which they are not very liable to suffer seriously from worm infestation even though exposed to infection. It is, however, much better practice to keep the pigs

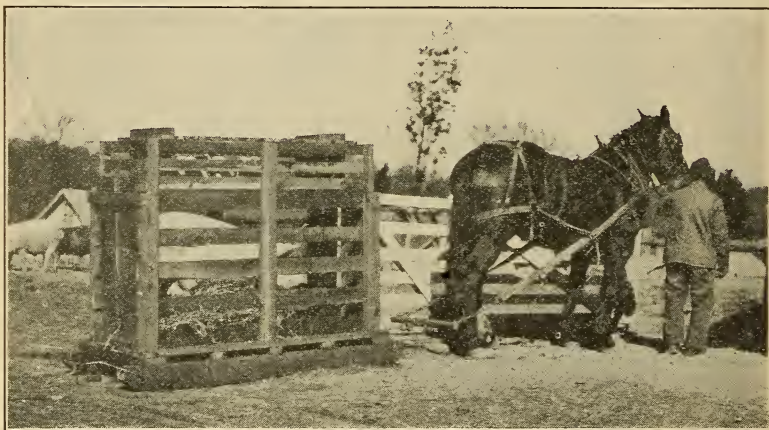


FIG. 5.—A barnyard Pullman consisting of a crate for hauling the sow and little pigs from the farrowing pen to the pasture. The crate is a double-deck affair; the sow rides below and the pigs above

away from dirty hog lots and on clean pasture until they are turned into the cornfield or otherwise fattened for market.

If there is much difference in the ages of the various litters, the pigs should be placed in several pastures according to age, or the one pasture may be subdivided. Mixing together pigs of widely different ages commonly results in the younger ones being robbed by the older ones, so that they do not have a fair chance to get the nourishment they need for proper growth. Temporary shade may be built in the pasture if natural shade is not available. Care should be taken to keep the bedding in the shelter houses in a clean and sanitary condition. Some hog raisers move the shelter houses from time to time and burn the old bedding. The location of the feeding ground should be shifted occasionally, the surroundings of the water supply maintained in a sanitary condition, and the development of mud wallows prevented.

### Fall Pigs

In the case of fall pigs, if not farrowed too late, the same system may be followed with slight modifications. The permanent farrowing house need not be used. If the sows have been running on pasture and are not incrustated with mud and filth, they may be transferred directly, without washing, to the special pasture, and the farrowing done in the individual houses in this pasture. In regions not too far north the pigs, if farrowed at the very beginning of fall or at the end of summer, will be past the age of greatest susceptibility to worm infection before it is necessary to put them in winter quarters that are likely to be more or less contaminated.

### Permanent Hog Lots and Feed Yards Dangerous

It is desirable to have yards that are much used by hogs so arranged that a change can be made every year or two to fresh ground, plowing under the surface infection on the old ground, sowing a crop, and allowing a firm surface to become reestablished before using it again for hogs. Hog yards in any case should be selected with the view to having proper drainage, and to being able to keep them in a sanitary condition, as free as possible from the common type of mud wallow which usually becomes a reservoir of concentrated infection that causes disease. It is nearly always feasible to replace mud wallows at comparatively slight expense with shallow, concrete wallowing tanks so constructed as to be maintained in a sanitary condition. As shown in Farmers' Bulletin 1085<sup>4</sup> such a tank can also be used as a means of applying remedies for lice and mange.

From what has been said as to the occurrence, in children, of worms not distinguishable from swine ascarids, it is obvious that children on the farm, particularly if young, should not be permitted to play in places that have been exposed to infection from either hogs or human beings. While there is still a question as to whether swine ascarids will develop to maturity in human beings, there is no question but that the young worms pass through the lungs and do more or less damage.

### Benefits from the System

The following benefits resulting from the use of the swine-sanitation system have been reported by farmers: By its use the farmer can raise as many pigs from two sows as are raised from three under the usual dirty hog-lot conditions; the pigs are ready for market from four to eight weeks earlier, and there is the accompanying saving in feed and care; and the herds are of uniform size and quality and practically devoid of runts. (Fig. 6.)

### Summary of the Swine-Sanitation System

Remove all litter and trash from the farrowing pens and thoroughly clean them with hot water, soap, and lye, and the vigorous use of shovel and brush.

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<sup>4</sup> See footnote 3.

A few days before her farrowing time scrub the sow thoroughly with a brush, using soap and warm water to remove dirt and worm eggs, paying especial attention to the udder. But nothing should be neglected—not even the feet. Then put the clean sow into the clean farrowing pen. When the sow has been dried off after cleaning and before farrowing, oil her in order to control lice and mange.

Ten days or so after the farrowing haul (don't drive) the sow and little pigs to a clean pasture containing a suitable forage crop on which there have been no pigs since the crop was sown. Keep



FIG. 6.—The result of sanitation. Six-months-old pigs raised under the swine-sanitation system. Note the uniform size and quality

other pigs away from this pasture and keep these pigs away from dirty hog lots.

Provide plenty of shelter and shade, and a fresh, safe, water supply for the pigs.

Leave the pigs on the pasture until they are at least 4 months old or have attained an average weight of 100 pounds; when possible, leave them there until they can be turned into the cornfields or otherwise fattened for market.

Fall pigs may be farrowed in individual houses on clean pasture, the sows being washed if necessary before being taken to the pasture.

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